

μA719C

HIGH GAIN RF AMPLIFIER/FM DETECTOR

FAIRCHILD LINEAR INTEGRATED CIRCUITS

- HIGH GAIN AT 10.7 MHz
- AGC RANGE > 30 dB
- TWO SEPARATE AMPLIFIERS
- SUPPLY VOLTAGE 5 TO 15 VOLTS
- OPTIONAL FM QUADRATURE DETECTOR

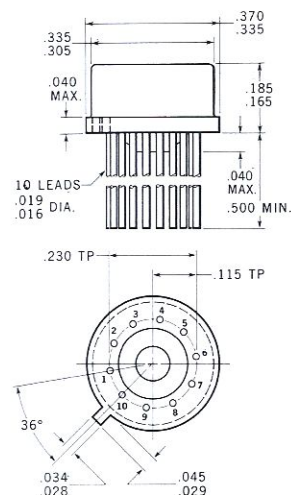
GENERAL DESCRIPTION — The μA719C is a high gain RF amplifier/FM detector which contains two independent amplifier sections designed for IF systems to 50 MHz. Section 1 utilizes three cascaded emitter coupled amplifiers having high gain and a reverse AGC capability. In addition, Section 1 may be used as an amplifier limiter and quadrature detector for FM systems. Section 2 is a single stage amplifier useful from DC to 50 MHz.

ABSOLUTE MAXIMUM RATINGS

Supply Voltage	15 V
Output Collector Voltage (Section 1)	20 V
Voltage between "High Input 1" and "Low Input 1" Terminals	±5.0 V
Voltage between "Quad" and "Ground" Terminals	0 to +4.0 V
Voltage between "Input 2" and "Ground" Terminals	±2.0 V
Power Dissipation	350 mW
Maximum Chip Temperature	+150°C
Storage Temperature Range	-65°C to +150°C
Operating Temperature Range	0°C to +70°C
Lead Temperature (Soldering, 60 second time limit)	300°C

PHYSICAL DIMENSIONS

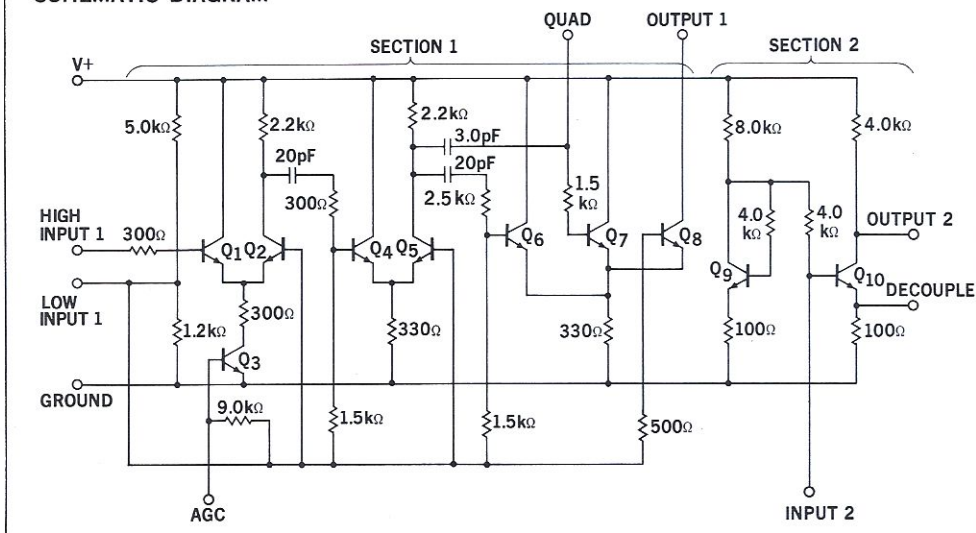
(In accordance with JEDEC TO-100)



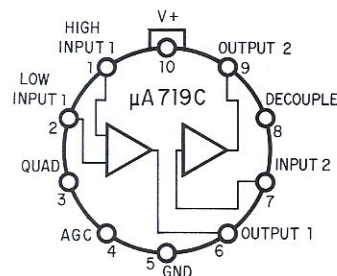
NOTES: All dimensions in inches
Leads are gold-plated Kovar
Package weight is 1.02 grams

ORDER PART NO.
U5F7719393

SCHEMATIC DIAGRAM



CONNECTION DIAGRAM (TOP VIEW)



FAIRCHILD LINEAR INTEGRATED CIRCUITS $\mu A719C$

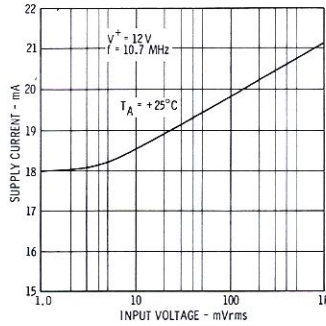
ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$, $V^+ = 12\text{ V}$, Test Circuit 1 unless otherwise specified)

PARAMETER (See Definitions)	TEST CONDITIONS	TYP.	UNITS
Supply Current	$\left\{ \begin{array}{l} T_A = +25^{\circ}\text{C} \\ T_A = 0^{\circ}\text{C} \\ T_A = +70^{\circ}\text{C} \end{array} \right.$	18 17.5 17	mA mA mA
Supply Current	$V^+ = 9.0\text{ V}$,	12.5	mA
Power Dissipation	$\left\{ \begin{array}{l} T_A = +25^{\circ}\text{C} \\ T_A = 0^{\circ}\text{C} \\ T_A = +70^{\circ}\text{C} \end{array} \right.$	216 210 204	mW mW mW
Power Dissipation	$V^+ = 9.0\text{ V}$,	113	mW
Section 1 Quiescent Output Current		2.5	mA
Section 1 DC Voltage at AGC Terminal		0.73	V
Section 1 AGC Current For 30 dB AGC	$f = 10.7\text{ MHz}$, Test Circuit 3	170	μA
Section 1 Output Current	$f = 1.0\text{ MHz}$, Test Circuit 8	4.4	mA p-p
Section 1 Voltage Gain	$f = 10.7\text{ MHz}$, Test Circuit 3		
	$\left\{ \begin{array}{l} T_A = +25^{\circ}\text{C} \\ T_A = 0^{\circ}\text{C} \\ T_A = +70^{\circ}\text{C} \end{array} \right.$	60 63 58	dB dB dB
Section 1 Voltage Gain	$f = 10.7\text{ MHz}$, Test Circuit 3, $V^+ = 9.0\text{ V}$	53	dB
Section 1 Input Voltage For -3.0 dB Limiting	$f = 4.5\text{ MHz}$, Test Circuit 4	1.5	mV
Section 1 Noise Figure	$R_S = 1.0\text{ k}\Omega$, Test Circuit 5		
	$\left\{ \begin{array}{l} f = 4.5\text{ MHz} \\ f = 10.7\text{ MHz} \end{array} \right.$	7.0 7.0	dB dB
Section 2 DC Voltage at Output 2		6.3	V
Section 2 Voltage Gain	$f = 1.0\text{ kHz}$, Test Circuit 2	31	dB
Section 2 Voltage at Output 2 Without Clipping	$f = 1.0\text{ kHz}$, Test Circuit 2	10	V p-p

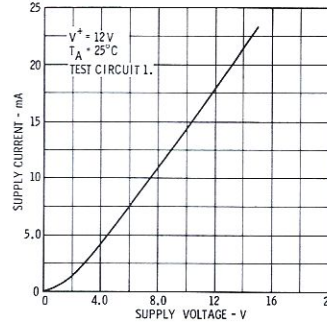
PARAMETERS (See Definitions)	TEST CONDITIONS	$f = 4.5\text{ MHz}$ TYP.	$f = 10.7\text{ MHz}$ TYP.	UNITS
SECTION 1				
Input Conductance	$e_{IN} \leq 20\text{ mV}$ Test Circuit 6	170	300	μmho
Input Capacitance	$e_{IN} \leq 20\text{ mV}$ Test Circuit 6	7.5	6.3	pF
Output Conductance	Test Circuit 7	50	130	μmho
Output Capacitance	Test Circuit 7	6.7	5.4	pF
Forward Transadmittance	Test Circuit 8	2200	1400	mmho
Forward Transadmittance	Test Circuit 8 $V^+ = 9.0\text{ V}$	1000	600	mmho
Quad Conductance	Test Circuit 9	200	330	μmho
Quad Capacitance	Test Circuit 9	8.0	7.0	pF
Gain Maximum Available (GMA)	Test Circuit 5	83	71	dB
Gain Maximum Stable (GMS)	Test Circuit 5	85	78	dB
SECTION 2				
Input Conductance	$\left\{ \begin{array}{l} \text{Test Circuit 10} \\ \text{Pin \#8 Unbypassed} \\ \text{Pin \#8 Bypassed} \end{array} \right.$	300 360	300 460	μmho μmho
Input Capacitance	$\left\{ \begin{array}{l} \text{Test Circuit 10} \\ \text{Pin \#8 Unbypassed} \\ \text{Pin \#8 Bypassed} \end{array} \right.$	3.3 10.4	3.3 8.7	pF pF
Output Conductance	$\left\{ \begin{array}{l} \text{Test Circuit 11} \\ \text{Pin \#8 Unbypassed} \\ \text{Pin \#8 Bypassed} \end{array} \right.$	250 270	260 340	μmho μmho
Output Capacitance	$\left\{ \begin{array}{l} \text{Test Circuit 11} \\ \text{Pin \#8 Unbypassed} \\ \text{Pin \#8 Bypassed} \end{array} \right.$	5.2 8.9	5.2 8.0	pF pF
Forward Transadmittance	$\left\{ \begin{array}{l} \text{Test Circuit 12} \\ \text{Pin \#8 Unbypassed} \\ \text{Pin \#8 Bypassed} \end{array} \right.$	8.0 34	8.0 34	mmho mmho
Gain Maximum Available (GMA)	$\left\{ \begin{array}{l} \text{Pin \#8 Unbypassed} \\ \text{Pin \#8 Bypassed} \end{array} \right.$	24 35	24 32	dB dB

TYPICAL PERFORMANCE CURVES

SUPPLY CURRENT AS A
FUNCTION OF
INPUT 1 SIGNAL VOLTAGE

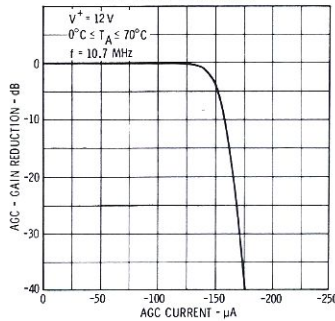


SUPPLY CURRENT AS A
FUNCTION OF SUPPLY VOLTAGE

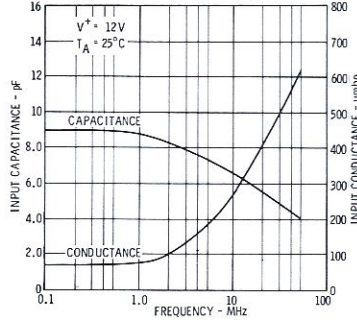


SECTION 1

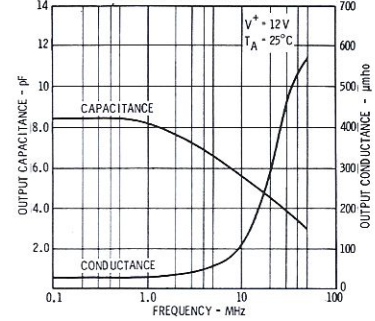
AGC AS A FUNCTION
OF AGC CURRENT



SECTION 1
INPUT CAPACITANCE AND
CONDUCTANCE AS A
FUNCTION OF FREQUENCY

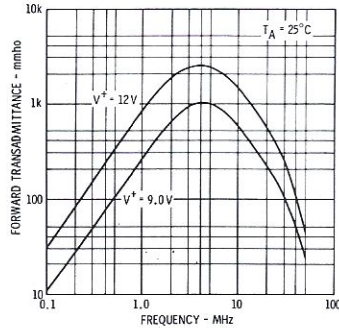


SECTION 1
OUTPUT CAPACITANCE AND
CONDUCTANCE AS A
FUNCTION OF FREQUENCY

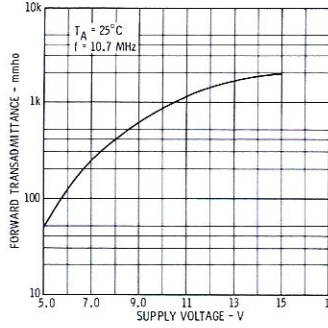


SECTION 1

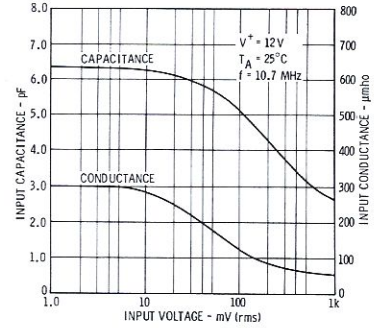
FORWARD TRANSMITTANCE AS
A FUNCTION OF FREQUENCY



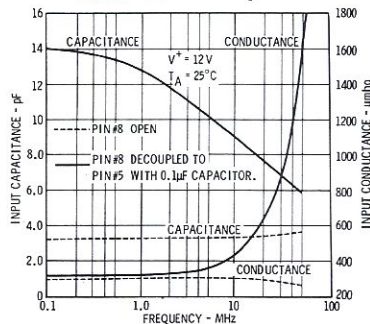
SECTION 1
FORWARD TRANSMITTANCE
AS A FUNCTION OF
SUPPLY VOLTAGE



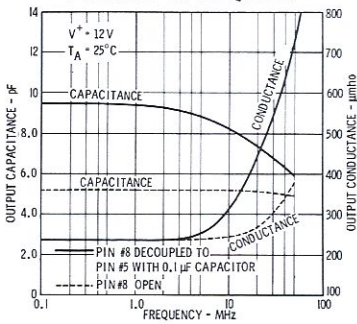
SECTION 1
INPUT CAPACITANCE AND
CONDUCTANCE AS A FUNCTION
OF INPUT SIGNAL VOLTAGE



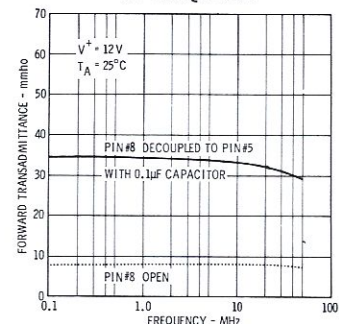
SECTION 2
INPUT CAPACITANCE AND
CONDUCTANCE AS A
FUNCTION OF FREQUENCY



SECTION 2
OUTPUT CAPACITANCE AND
CONDUCTANCE AS A
FUNCTION OF FREQUENCY

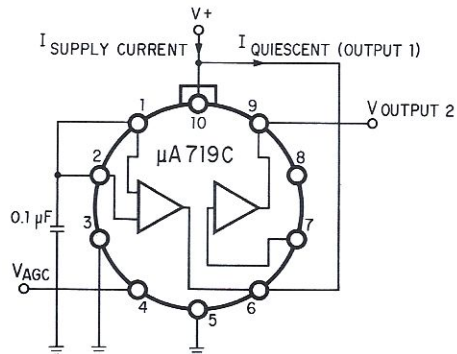


SECTION 2
FORWARD TRANSMITTANCE
AS A FUNCTION
OF FREQUENCY

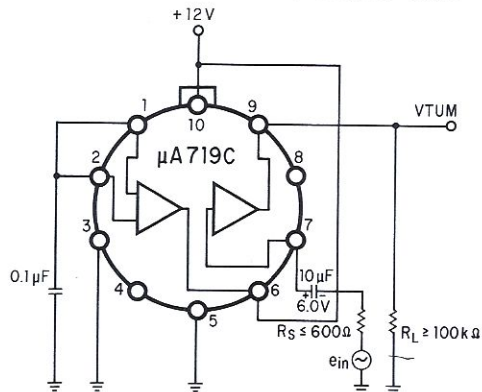


TEST CIRCUITS

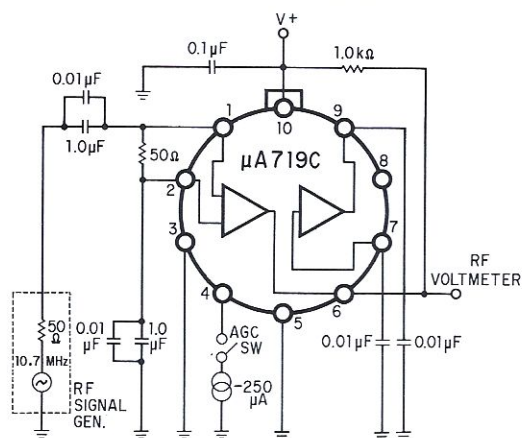
DC MEASUREMENTS



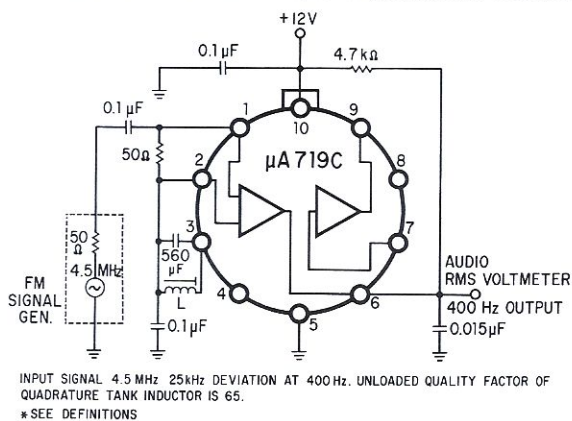
SECTION 2 GAIN AND OUTPUT VOLTAGE SWING



10.7 MHz VOLTAGE GAIN AND AGC

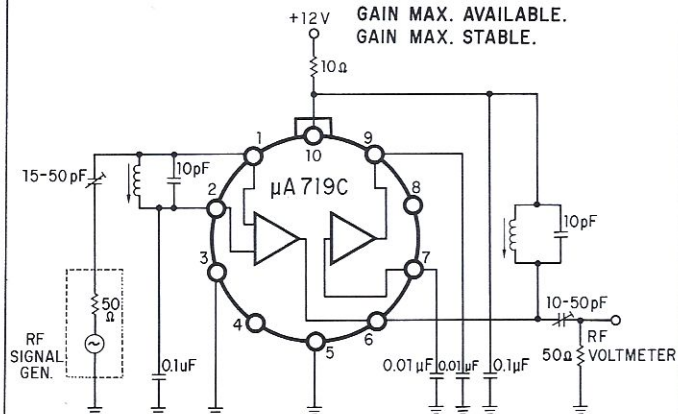


-3.0dB LIMITING AT 4.5 MHz USING A QUADRATURE DETECTOR*

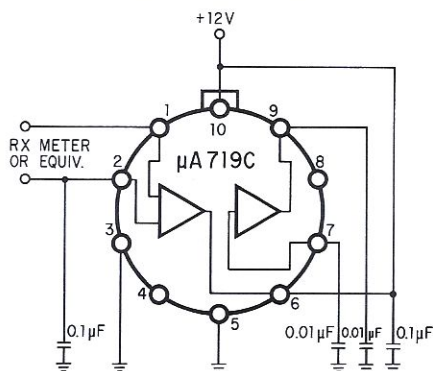


SECTION 1: NOISE FIGURE.

+12V	GAIN MAX. AVAILABLE.
♀	GAIN MAX. STABLE.



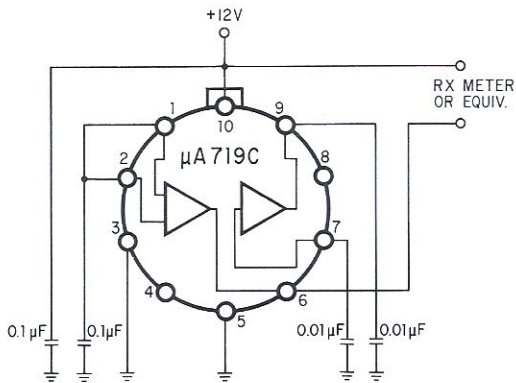
SECTION 1 INPUT PARAMETERS



TEST CIRCUITS

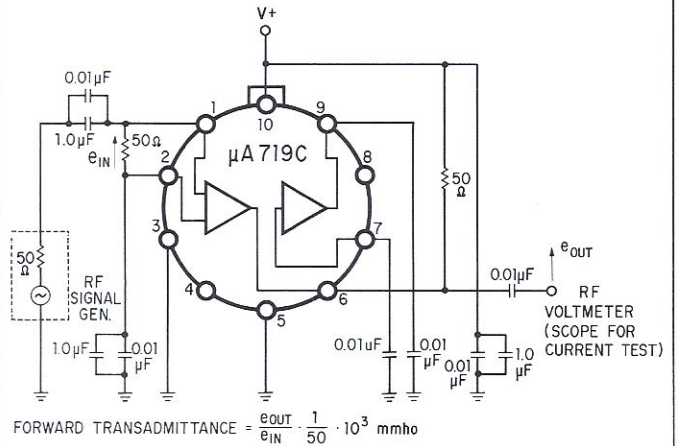
TEST CIRCUIT 7

SECTION 1 OUTPUT PARAMETERS



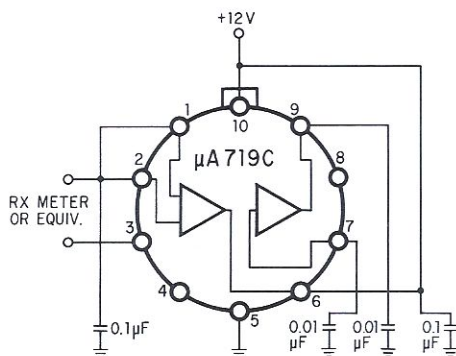
TEST CIRCUIT 8

SECTION 1 FORWARD TRANSADMITTANCE OUTPUT CURRENT



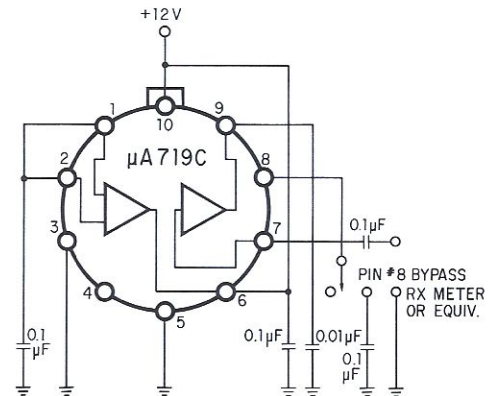
TEST CIRCUIT 9

SECTION 1 QUAD PARAMETERS



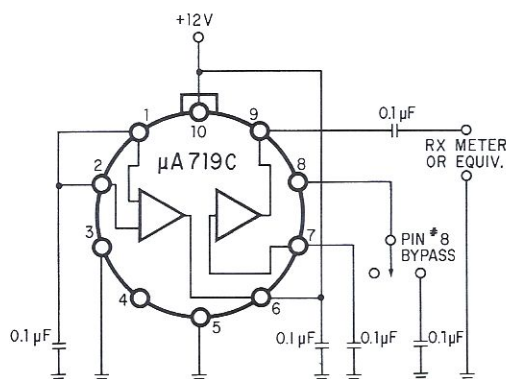
TEST CIRCUIT 10

SECTION 2 INPUT PARAMETERS



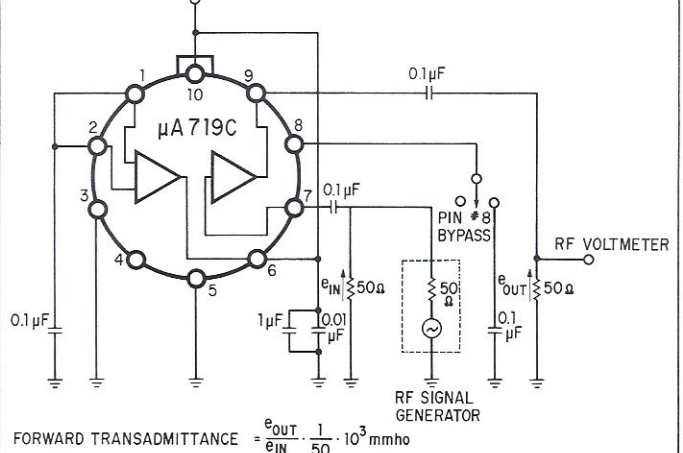
TEST CIRCUIT 11

SECTION 2 OUTPUT PARAMETERS



TEST CIRCUIT 12

SECTION 2 FORWARD TRANSADMITTANCE



DEFINITION OF TERMS

Gain Maximum Available (GMA) — This gain figure is the theoretical maximum power gain of an amplifier with conjugate matching at both the input and the output terminals and assumes no reverse transadmittance (feedback component) in the amplifier.

$$GMA = \frac{| \text{forward transadmittance} |^2}{4 \times \text{input conductance} \times \text{output conductance}}$$

Gain Maximum Stable (GMS) — This gain figure gives the maximum possible gain based on stability criteria only. This gain figure does not necessarily represent the realizable power gain of an amplifier. For unneutralized amplifiers, the maximum power gain realizable based on normal circuit tolerances is either (GMS - 6.0 dB) or GMA, whichever is smaller.

$$GMS = \frac{| \text{forward transadmittance} |}{| \text{reverse transadmittance} |}$$

Input Voltage For -3.0 dB Limiting — Refer to Test Circuit 4 which shows the μ A719C being used as an amplifier, limiter, and FM detector (simple quadrature type with the LC tank circuit connected between pins No. 3 and No. 2). An input FM signal (carrier frequency 4.5 MHz, ± 25 kHz deviation at 400 Hz) of 50 mV rms is applied to the μ A719C and the value of the recovered audio output signal (400 Hz) at pin No. 6 is noted. The -3.0 dB input limiting voltage is defined as the value of the input voltage to produce an output voltage 3dB below the output level obtained with 50 mV rms of input signal.